2.0 BACKGROUND

The evaluation focused on the air quality planning areas HA76, HA83, and HA85 because the minor source baseline dates have been triggered in these HAs by PSD permit applications for major sources. In the Fernley area, the sulfur dioxide (SO_2) minor source baseline date was triggered for HA76 on October 26, 1982 as a result of an application submitted by Nevada Cement Company. In the Truckee River Corridor, the SO_2, nitrogen dioxide (NO_2), and particulate matter smaller that 10 microns (PM_{10}) minor source baseline dates were triggered for HA83 on March 11, 1994, and the SO_2 minor source baseline date was triggered for the planning area represented by HA85 on January 9, 1996, each as a result of permit applications submitted by Sierra Pacific Power Company for modifications at the Tracy Generating Station. Because the minor source baseline dates were triggered in the planning area, PSD increment must be tracked to ensure that air quality does not deteriorate beyond the specified regulatory increment for each of the triggered pollutants.

The PSD increment evaluation is based on the changes in modeled concentrations of airborne contaminants from pollutant emissions as of the major or minor baseline dates compared with modeled concentrations from current pollutant emissions. PSD increment impacts occur with changes to affected stationary, area, or mobile sources that existed as of the major and minor baseline dates. Changes that affect PSD increment impacts include increasing or decreasing emissions, increasing or decreasing effective stack height, changing the orientation of the stack (vertical or horizontal), and moving the location of a source.

Emission inventories were developed for each applicable pollutant, planning area, and baseline date using data from sources that included NDEP records, the U. S. Environmental Protection Agency's (EPA) Aerometric Information Retrieval System Database (AIRData), National Air Pollutant Emission Trends (NET) database, and Nevada Department of Transportation (NDOT) records. Baseline emission source data represent stationary source operations as of a given baseline date, and were based on available records from the closest date prior to the baseline date. In other words, Tetra Tech used emission data as near to the baseline date as possible where records exist, but before the baseline trigger date. In some cases, the only recorded emission data are two to three years prior to a given baseline date. Fugitive emissions caused by railroads, vehicles, and miscellaneous sources also consume PSD increment after the minor source baseline date. Therefore, minor source baseline inventories and the current emission inventory included fugitive emissions. The EPA maintains some records of these fugitive emissions for each county in every state in the AIRData NET database.

After the emission inventories were established, modeling was completed for each PSD triggered pollutant in HA76, HA83, and HA85. The results from modeling each emission inventory scenario were compared with modeling results from the current situation for each HA and pollutant. This analysis used the American Meteorological Society/EPA Regulatory Model Improvement Committee Dispersion Model (AERMOD). This model was selected for the study because EPA is in the process of adopting this model for regulatory use, and Tetra Tech and NDEP want to ensure that the PSD increment tracking system developed using this model is not outdated when the upgrade occurs. The algorithms AERMOD uses to model terrain effects are more complex than in the Industrial Source Complex Short-Term Model Version 3 (ISCST3), which is the current EPA dispersion model of choice.

An Increment Tracking System (ITS), database and geographic information system (GIS) desktop application was developed to permit access to major and minor source baseline information, annual emissions data, and permitted emissions data. The ITS combines the relational database capabilities of Microsoft Access with the spatial analysis capability of ArcView (a geographic information system) to provide the BAPC and BAQP a desktop application that will improve the current method of storing, maintaining, retrieving, and presenting emissions data. Additionally, the ITS generates AERMOD model input data, using user defined parameters, and imports, stores, and presents post–processed AERMOD output files to provide BAPC and BAQP a method of archiving and reviewing results from model runs. The ITS provides users with a user-friendly graphical user interface (GUI) for entering data, querying data, generating model input files, and reporting capabilities. Appendix B describes the ITS. Appendix C presents the final output maps.

2.1 GOALS

The objective of the analysis was to evaluate and document the current status of PSD increments in HA76, HA83, and HA85, while establishing a PSD increment tracking system. To achieve these objectives, PSD increment source inventories and PSD increment modeling were completed. The following interim goals were established and attained throughout the project:

- Identify and collect data on major point sources within a 50-kilometer (km) radius of HA76, HA83, and HA85 for facilities in operation as of the baseline dates for major sources for each pollutant
- Identify and collect data on point sources and area fugitive emissions for operations in the planning areas as of the appropriate baseline dates for each pollutant
- Identify and collect data for current major and minor point sources and area fugitive emissions for PM_{10}, nitrogen oxides (NO_x), and SO_2
- Develop emission inventories that pertain to each HA for baseline dates and the affiliated pollutants
- Create an initial PSD increment tracking system database

- Model each emission inventory scenario and subtract results for the baseline date from results for the current date to calculate existing PSD increment consumption and expansion
- Display PSD modeling results using GIS technology

The following section describes the project phases and how these goals were achieved.

2.2 PROJECT PHASES

The state of increment consumption in HA76, HA83, and HA85 was evaluated, and the increment tracking system was produced in seven project phases. Each phase included components for emissions inventorying, information technology (IT), and GIS. The seven phases described in the following sections explain how current PSD increment consumption was modeled and how the PSD increment tracking system was developed. Figure 2-1 is a flow diagram that shows the progression of the seven phases.

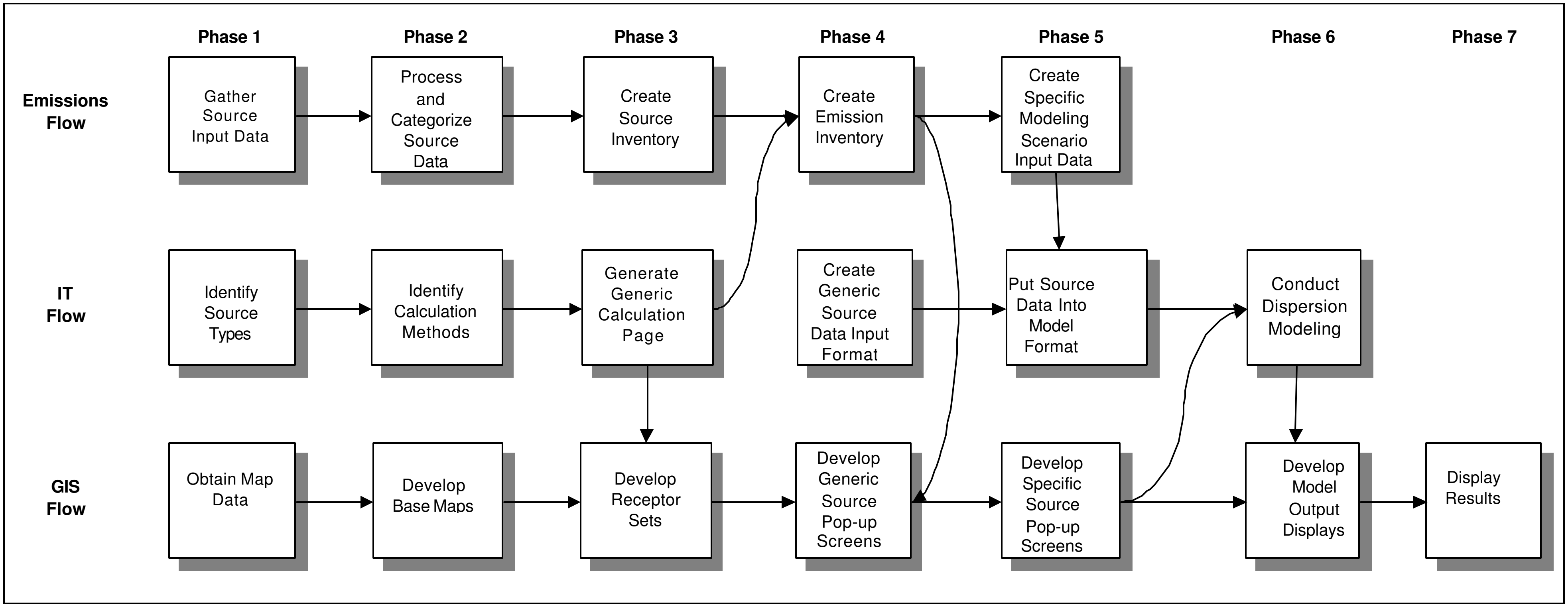
2.2.1 Phase I

In this phase, the project team met to explore the scope of the project and to fully explain the remaining six phases of the project. The project team was made up of air quality scientists, IT specialists, and GIS specialists. During Phase I, air quality scientists investigated sources of emissions data. They sought out available information on the Internet and selected the information that should be included in the investigation. Tetra Tech identified the source types that would be entered into the database, and established the parameters that would be needed in the database for both point and fugitive sources. Map data were obtained from the U.S. Geological Survey (USGS) and the U.S. Bureau of the Census for the study area during this phase.

2.2.2 Phase II

During Phase II, Tetra Tech decided how the data collected would be used in an interactive format to produce emission inventories, an increment tracking system, and a graphical representation of increment consumption in the planning areas. The information on point sources was processed and categorized so it would be ready for input into an emission inventory for each of the baseline dates. The project team identified database themes that would be used for the increment tracking system. These themes consisted of emission calculation fields as well as point source parameter fields. The team then developed base maps for each HA. The maps displayed each HA with area grid cells as an overlay. The maps also showed the interstate highways and railroads that pass through HA76, HA83, and HA85.

FIGURE 2-1
PREVENTION OF SIGNIFICANT DETERIORATION INCREMENT
STUDY PROJECT FLOW DIAGRAM



2.2.3 Phase III

The third phase of the project focused mainly on compiling the point source inventory. Tetra Tech finished categorizing the point sources, and then organized the data from the source inventory into a usable format for the IT database. Data on fugitive emissions were also collected and apportioned into the grid cells of each HA for the baseline dates for minor sources. Receptor sets were created for use in modeling the PSD increment for each HA.

2.2.4 Phase IV

The project team completed emission inventories for each baseline date, pollutant and HA during Phase IV. A generic source data input format was developed from the nearly complete emission inventories for each baseline date. This format enabled the database to produce information on point sources in an AERMOD input file format. Additionally, the project team developed generic emissions pop-up screens, which became templates for the final increment tracking system, as point and area source emissions data became available.

2.2.5 Phase V

Phase V was the modeling phase, and specific modeling scenarios were created during this phase. Tetra Tech processed the meteorological data with the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee Dispersion Model (AERMOD) meteorological preprocessor (AERMET), and assigned elevations to the receptor sets using the AERMOD terrain processor (AERMAP). The point and area source data were put into model format. The results were model input files for each modeling scenario. The pop-up screens for the increment tracking system were finalized.

2.2.6 Phase VI

The sixth phase involved the dispersion modeling for each scenario and development of displays of model output for the increment tracking system. The project team completed a quality assurance/quality control (QA/QC) check of the model runs and refined the model. The modeling results indicated the state of PSD increment consumption in the three HAs. GIS output displays show the modeling results in a map format.

2.2.7 Phase VII

GIS output displays and the final report were completed during Phase VII.

2.3 PSD INCREMENT

PSD increments are the maximum permissible level of increased air quality impacts, due to sources and emissions meeting regulatory criteria, which may occur beyond a regulatory baseline air quality level. PSD regulations in Title 40 of the Code of Federal Regulations, Part 52 Subpart 21 (40 CFR 52.21) establish PSD increments. Allowable PSD increments have been established for SO_2, NO_2, and PM_{10} for various averaging periods. Allowable PSD increments do not exist for other pollutants. PSD regulations are intended to preserve existing clean air resources and allow for economic growth. PSD increments are an important part of the program to achieve this objective. PSD increments are designed to protect against excessive deterioration of air quality. It is important to note that regulations do not allow ambient air quality to exceed the applicable National Ambient Air Quality Standards (NAAQS) limits, even if all the PSD increment is not consumed (EPA 1990).

PSD increments are tracked on a pollutant-by-pollutant and planning area by planning area basis. PSD increment impacts represent net air quality impacts in a triggered planning area, compared to baseline conditions. PSD increments result from applicable changes to sources of the pollutant of concern. The effect of applicable changes on PSD increments are tracked by calculating net air quality impacts through the use of air quality dispersion models. Net changes can result in either a lower air quality impact, referred to as increment expansion, or a higher air quality impact, referred to as increment consumption. The rules in 40 CFR 52.21 establish the maximum allowable increment consumption for SO_2, NO_2, and PM_{10} for various averaging periods.

PSD increment net changes are tracked relative to baseline impact conditions on two key baseline dates, one for minor sources of the pollutant of concern and one for major sources of the pollutant of concern. This results in the establishment of minor source baseline dates and major source baseline dates for each pollutant, SO_2, NO_2, and PM_{10}. Minor source baseline dates are established according to permitting activities in each planning area, while major source baseline dates have been established within the CFR for each pollutant on a nationwide basis. Emission inventories were established for the pollutants of concern relative to the applicable baseline dates.

PSD increment impacts are not tracked and have no regulatory bearing in a given planning area before the minor source baseline date is established in that planning area for a particular pollutant. After the minor source baseline date for SO_2, NO_2, or PM_{10} is triggered in a planning area, PSD increments of that pollutant must be quantified based on:

1. All quantifiable changes at minor stationary sources and any changes to area or mobile sources within the triggered planning area since the minor source baseline date.
2. Formal changes at major sources within (or outside, but with the ability to affect) the planning area following the major source baseline date for a particular pollutant.

Minor source and major source baseline dates have different source change criteria that establish affects on PSD increment. The changes in impacts of triggered pollutants are primarily associated with construction at major stationary sources after the major source baseline date, or with any changes after the minor source baseline date at major and minor stationary sources and any quantifiable changes to area or mobile sources of the triggered pollutant.

Major source baseline dates establish the basis for tracking impacts from construction at major sources and were set when the PSD increment consumption regulations were promulgated for the given pollutant. Baseline source data on major sources that existed as of the major source baseline date are identified to establish baseline conditions. The impacts resulting from changes to source emissions and parameters associated with construction or other permitted activities since the major source baseline date affect the available increment. The baseline dates for major sources are set nationwide as follows:

- January 6, 1975 – for SO_2 and PM_{10}
- February 9, 1988 – for NO_2

It is important to note that the increment is not affected in a planning area until the minor source baseline date for a particular pollutant, SO_2, NO_2, or PM_{10}, is triggered for that planning area. When a major stationary source submits a major PSD permit modification of SO_2, NO_2, or PM_{10} emissions, or a new stationary source submits a permit application that shows it is a major source for SO_2, NO_2, or PM_{10} and the application is deemed complete, the pollutant-specific minor source baseline date is triggered in the planning area the major source is located in. Planning areas that have a triggered minor source baseline dates are those where an applicable new or modified stationary source is located, and/or where the change in increment consuming emissions has a potential to increase the ambient concentrations by 1 microgram per cubic meter ($\mu g/m^3$) or more.

Minor source baseline dates mark the beginning of accounting for 3increment consumption and/or expansion. After the minor source baseline date is triggered, increment is consumed and/or expanded in the planning area by impacts attributable to changes at any major sources or at minor and fugitive sources in the planning area. Tracking increments requires maintaining records on changes to all major sources and changes to minor sources and fugitive emissions located in a triggered planning area.

Minor source baseline dates applicable to the study areas are:

- October 26, 1982 – HA76 was triggered for SO_2 by an application from Nevada Cement for a 3rd Kiln.
- March 11, 1994 – HA83 was triggered for SO_2, NO_2 and PM_{10} by an application from Sierra Pacific Power Company for the Piñon Project.
- January 9, 1996 – HA85 was triggered for SO_2 by an application from Sierra Pacific Power Company for the Clark Mountain Turbine modification.